

(21) Application No 9003320.0

(22) Date of filing 14.02.1990

(30) Priority data  
 (31) 01103739 (32) 22.04.1989 (33) JP

(71) Applicant  
**Pioneer Electronic Corporation**  
 (Incorporated in Japan)  
 4-1 Meguro, 1-chome, Meguro-ku, Tokyo, Japan

(72) Inventor  
**Kunio Mitobe**

(74) Agent and/or Address for Service  
**Gill Jennings & Every**  
 53-64 Chancery Lane, London, WC2A 1HN,  
 United Kingdom

(51) INT CL<sup>6</sup>  
**H04R 9/02**

(52) UK CL (Edition K)  
**H4J JED J30F J30L J34C J34X**

(56) Documents cited  
**GB 1478169 A**

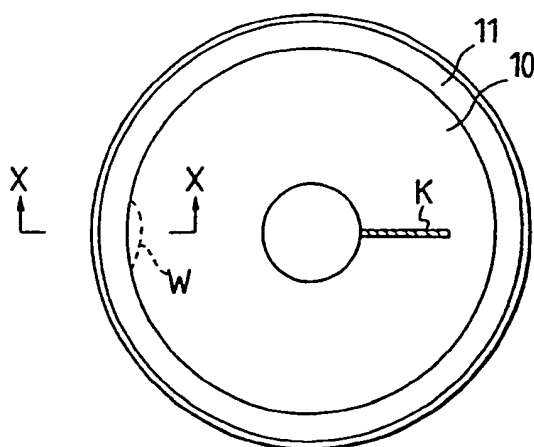
(58) Field of search  
 UK CL (Edition J) **H4J JDT JED**  
 INT CL<sup>4</sup> **H04R 7/00 7/02 9/00 9/02 9/04**

**BEST AVAILABLE COPY**

(54) **Loudspeaker diaphragm balancing**

(57) A cone-type speaker includes a diaphragm (10, 11) and a voice coil for receiving an electric sound signal through a wire (K), and a weight portion (W) formed on an edge (11) of the vibration system when the edge is formed. The weight portion serves to balance the weight of the wire, thereby preventing rolling of the vibration system.

**FIG. 1**



**GB 2 230 677 A**

FIG. 1

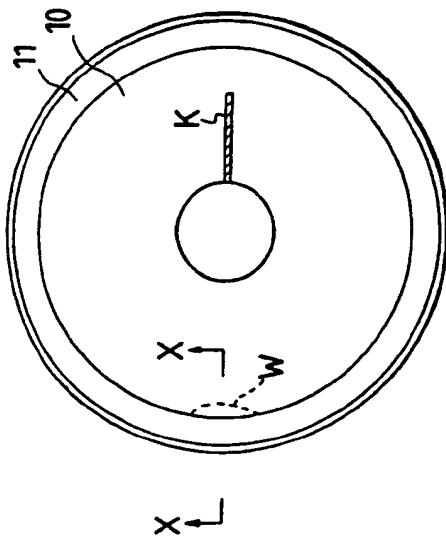


FIG. 4

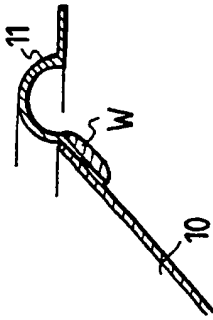


FIG. 5

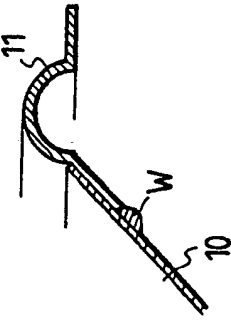


FIG. 6

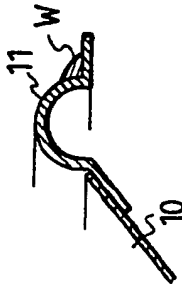


FIG. 2

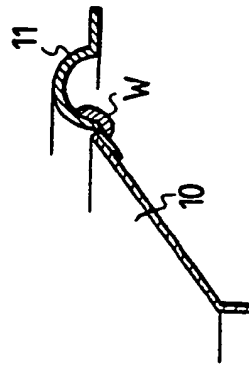


FIG. 3

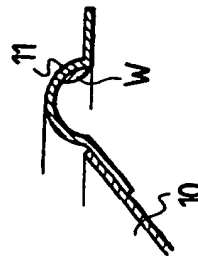
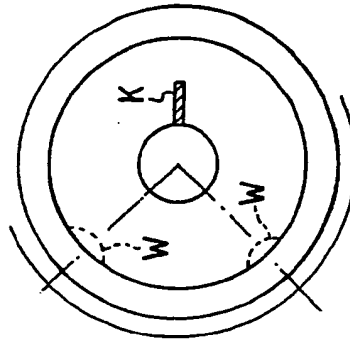


FIG. 7



CONE-TYPE SPEAKER

5 The present invention relates to a cone-type speakers, and more particularly, relates to a cone-type speaker which prevents rolling vibrations caused by an imbalance of the speaker's vibration system.

10 With the recent trend towards miniaturization of speaker systems, high-compliance vibration systems, especially diaphragms, have been required in order to improve low-band reproducing characteristics. In such a high-compliance diaphragm, the weight balance sometimes becomes unbalanced by the presence of, for example, solder and tinsel wire connected to a conical diaphragm. As a result, rolling is generated during piston movement, 15 thereby causing abnormal vibrations which results in abnormal sound from the rubbing of a voice coil, flapping by the diaphragm, etc.

20 As a representative prior art system, reference can be made to Japanese Utility Model Post-Examination Publication No. 57-10155.

25 In such a prior art system, although weight balance can be performed, a bonding step or the like is required, thereby making the production of the system difficult and expensive. Accordingly, it cannot be said that this prior art is a perfect countermeasure.

It is therefore an object of the present invention to provide weight balance during the formation of a vibration system, thereby solving the production problems associated with the prior art systems.

30 In order to obviate the problems as described above, a cone-type speaker according to the present invention is configured so that an electric sound signal is fed to a voice coil through a tinsel wire, and a balance portion, which serves as a counter balance, is formed on an edge of a vibration system of the cone-type speaker when the edge 35 is formed.

The balance portion may be formed on the rear side of the edge, or it may be formed on the front side of the edge. The balance portion may also be formed on the edge at its outer periphery or at its portion integrated with a diaphragm.

Referring to the accompanying drawings, embodiments of the cone-type speaker according to the present invention will now be described.

Figure 1 is a plan view of a vibration system of a first speaker;

Figures. 2 through 6 are partially enlarged sectional views showing embodiments taken on a line XX in Figure 1; and

Figure 7 is a plan view showing another embodiment of the invention.

As shown in Figure 1, reference numeral 10 designates a cone-type diaphragm. An edge 11 is formed on the diaphragm 10 at its circumference through insertion-moulding, or the like. A counterbalance weight W in the form of a balance portion is integrally formed on the rear side of the edge 11 when it is formed through injection moulding so that the balance weight W is positioned on a diametric line extending through a tinsel wire K. The weight, size and position of the balance weight W are determined so that the balance weight W serves to balance the tinsel wire K attached to the diaphragm 10. Specifically, as shown in Figure 2, the balance weight W is provided in the vicinity of a connection portion between the edge 11 and the diaphragm 10 or, as shown in Figure 3, the balance weight W is provided adjacent to the radially outer periphery of its rear side.

As shown in Figure 4, the balance weight W may be formed on the back surface of the connection portion between the edge 11 and the diaphragm 10. As shown in Figure 5, the balance weight W may be formed on the edge 11 at its radially inner periphery, or, as shown in Figure 6,

the weight W may be formed on the edge 11 at its front, adjacent to the radially outer periphery.

It is convenient when attaching the tinsel wire K, to stamp a symbol on the edge or the like so that the position of the balance weight W can be recognized from the front side.

Although the embodiments shown in Figs. 1-6 each show a balance weight W provided on the same diametric line as the tinsel wire K, the balance weight W may be divided into two equal weights W and W as shown in Figure 7.

Thus, a balance portion is simultaneously formed during the formation of the edge 11 (i.e., the balance portion and the edge 11 are simultaneously formed by insertion moulding), so that unbalance caused in the diaphragm 10 is eliminated, rolling never occurs when driving the diaphragm, and the diaphragm does not abnormally vibrate. Further, the resonance of the edge 11 can be varied to make the characteristics smooth.

CLAIMS

1. A cone-type speaker comprising a vibration system having an edge portion, and a voice coil for receiving an electric sound signal through tinsel wire attached to the vibration system, and a balance portion formed on an edge of the vibration system when the edge is formed, the balance portion being formed at a position of the edge to counter-balance the weight of the tinsel wire.
2. A cone-type speaker according to claim 1, wherein the balance portion is formed on the rear of the edge.
3. A cone-type speaker according to claim 1, wherein the balance portion is formed on the front of the edge.
4. A cone-type speaker according to any of claims 1 to 3, wherein the balance portion is formed on the edge at its inner periphery, at that portion of the edge which is integrated with a vibration system diaphragm.
5. A cone-type speaker according to any of claims 1 to 3, wherein the balance portion is formed at or adjacent a connection portion connecting the edge and the vibration system.
6. A cone-type speaker according to claim 5, wherein the balance portion is formed on the back surface of the connection portion.
7. A cone-type speaker according to any of claims 1 to 3, wherein the balance portion is formed at the edge portion's outer periphery.
8. A cone-type speaker according to any of claims 1 to 7, wherein the balance portion is formed on the edge at a

position through which passes a diametral line through the tinsel wire.

9. A cone-type speaker according to any of claims 1 to 7,  
5 wherein the balance portion comprises first and second portions.

10. A cone-type speaker according to claim 1,  
substantially as described with reference to any of the  
10 examples shown in the accompanying drawings.

11. A method of making a cone-type speaker comprising a  
vibration system having an edge portion and a voice coil  
for receiving an electric sound signal through tinsel wire  
15 attached to the vibration system, and a balance portion  
formed on an edge of the vibration system, wherein the  
balance portion is formed simultaneously with the formation  
of the edge portion.

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☒ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**